Important points to find on a parabola: vertex, y-intercept, x-intercepts. Use the quadratic formula to find the x-intercepts.

$y = a(x-h)^2 + k \ (vertex\ form)$

$y = ax^2 + bx + c \ (general\ form)$

*Next step: Changing general form to vertex form (see if we can discover a relationship for this).

Example: $y = 2x^2 + 7x + 1$ *write in vertex form without using calculator*

$y = 2(x + \frac{7}{4})^2 - \frac{41}{8}$ *need to find h (this is our x value) and k (the y value)

$h = -1.75 = -\frac{7}{4}$ $h = \frac{-b}{2a}$

*Graph it and use the power of the calculator to find the vertex (2nd TRACE - minimum)

*After finding h, you can plug it into the original equation and solve for k (that is where the $\frac{-41}{8}$ comes from.

*Where does $h = \frac{-b}{2a}$ come from:

$(x-h)^2 = (x-h)(x-h)$

$= x^2 - hx - hx + h^2$

$= x^2 - 2hx + h^2$

$ax^2 + bx + c = a(x-h)^2 + k$

$= a(x^2 - 2hx + h^2) + k$

$= ax^2 - 2ahx + ah^2 + k$

we can see the b= -2ah so $h = \frac{-b}{2a}$ *don't worry about k; plug in and solve for it.

example: $y = 4x^2 = 4x - 1 \ (a = 4, b = 4)$

$h = \frac{-4}{8} = \frac{-1}{2}$

$k = 4(\frac{-1}{2})^2 + 4(\frac{-1}{2}) - 1$

= $1 + -2 - 1$

= -2

vertex: ($\frac{-1}{2}, -2)$

$y = 4(x + \frac{1}{2})^2 - 2$ (equation of a parabola in vertex form) This is easier to see what the parabola looks like using transformation rules.